



## DEPARTMENT OF THE ARMY

U.S. Army Corps of Engineers  
WASHINGTON, D.C. 20314-1000REPLY TO  
ATTENTION OF:

CERE-E (25)

24 FEB 1998

## MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Valuation of Sites for Antenna or Tower Leases

1. The purpose of this memo is to provide policy regarding the valuation of sites for the placement or leasing of antennas and/or towers. The occurrence of these leases has become frequent enough to warrant a broader scale analysis, rather than individual appraisals for each instance.
2. Currently, the value attributable to the use and utility of antennas and antenna towers (within the industry) is based upon population density, type of antenna(s) required and service provided (two-way pager service, personal communications service, etc.). More densely populated areas and multiple types of service allow for greater revenue, and therefore greater site value. The value of a site for placement of an antenna is directly related to the profitability of the antenna(s) to be placed on the site.
3. Each division will be responsible for the preparation of a narrative analysis discussing the antenna and tower market(s), and the development of a matrix, or rate schedule establishing market values for the various types of usages in their area of operations. Divisions should obtain comparable data from their appropriate districts, and may assign one district to complete this analysis for their entire division area. It is recommended that other local Federal agencies be contacted for market data or rate schedules that they may be using. A brief appraisal format may be utilized for these assignments pursuant to the Jurisdictional Exception of USPAP.
4. If land is to be leased for the placement of an antenna tower, or an antenna tower is to be leased, value should be determined based upon the maximum potential income available, i.e., number and types of antennas. Determining market value by analyzing comparable land transactions with a different highest and best use or a replacement cost are not the approaches utilized by the industry.
5. The matrix should be completed using Excel, Lotus or similar spreadsheet; examples are attached. An understanding of the economics of the telecommunications industry is important in constructing the matrix. Comparable antenna leases for each category, e.g., rural, suburban, metro, as well as pager, or personal communications, may not be readily available and the establishment of relationships may be necessary.

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6. The division will review and update the schedule annually for technical support, including comparable data, and consistency. The use of the schedule will eliminate the need for individual appraisals on most proposed leases. The approved rate schedule establishes the basis for the value conclusion to be utilized and should reflect current market conditions.

FOR THE COMMANDER:



B. J. FRANKEL

Director of Real Estate

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## TELECOMMUNICATIONS MARKET ANALYSIS

The telecommunications industry is engaged in a rapid expansion as new technologies are researched, developed and implemented. Fueling these aggressive expansions are the newly identified market participants resulting from the most recent Federal Communications Commission (FCC) auctions of 1993 and 1994.

The FCC divided the country into six major regions. Each region is a collection of MTA's with common location attributes. The greater market area is located within Region Two. There are a limited number of market participants in the telecommunications industry as prescribed by the FCC. The FCC must license participants, a procedure that mandates a bidding process for available licenses.

### TELECOMMUNICATIONS SYSTEM

Wireless telecommunication is accomplished by linking analog or digital radio wave transmission devices through a series of short-range, contiguous cells to the conventional wired telephone system.

A cellular phone transmits a signal to the nearest cellular antenna where the signal is then relayed to the nearest land-based telephone line or dish. It is then forwarded to a central Mobile Telephone Switching Office (MTSO) which processes the information and transfers the call to the intended final destination.

Personal Communications Services (PCS) are the newest integrated systems of wireless communication. PCS largely operate in the newer 1900 MHZ frequency range, while the cellular, two-way radio, and paging services generally operate in the 800 to 900 MHZ frequency range.

Companies use teams of engineers to design a network affording optimum coverage. The area covered by a particular antenna is called a cell. Each market is divided into cell areas equipped with low-powered radio transmitters and receivers. The cells vary in size depending on terrain and capacity demands. It is often necessary for a particular service company to provide for "fill in" sites when obstructions are prevalent, or if peak level demand exceeds antenna capacity.

The industry typically segregates the market area into four primary market segments. The telecommunications industry follows a common path of development and related systems implementation. The market strives to achieve full coverage in the dense urban areas first, where the demand is the strongest, and then subsequently expand to urban, suburban, and finally rural market areas. The primary four market areas are described below.

**Dense Urban Market Area** - This area includes high density areas typically found in mature neighborhoods or central business districts within a town or city. Central business districts (CBD) are generally defined as the core, or downtown area of a particular city where major retail, financial, governmental, professional, cultural, and service activities are concentrated. Typically it is built out with high-rise office buildings and parking structures. As vacant land is often scarce or nonexistent, new construction of tower or pole antennas is often not an option. Alternative locations include water towers, roof tops, existing towers or utility poles, signs, smokestacks, highway structures, etc. Because of the many multistory building obstructions, and due to the high usage associated with CBD locations, telecommunication companies prefer to triangulate their equipment to include placement every 1/4 to 1/2 mile for optimum coverage. These locations are in proximity to major transportation linkages that typically accommodate substantial vehicular activity.

**Urban Market Area** - This area is also made up of densely populated areas of established cities or towns, less than those within the dense urban area. These areas are usually found located between CBD's and suburban locations. Population densities are less than those found in the dense urban areas, and obstacles such as high-rise structures may be spaced farther apart. Suitable land for new towers or poles is limited. Within these areas, optimum antenna placement is typically in the 1/2 mile to 2 mile range. Line of site placement is preferred, not subject to obstacles within the path between sectors. Urban locales are also in proximity to major transportation linkages that typically accommodate substantial vehicular activity and high usage.

**Suburban Market Area** - These markets are typically within a neighborhood setting or contains complementary properties to the core areas of the city. Typical commercial buildings are Class B type with suitable surface area parking available. Land is usually available for sale or lease to accommodate a tower or pole facility, however, zoning regulations may be restrictive or prohibit certain designs. Antennas are typically spaced 2 to 3 miles apart for acceptable coverage. Line of site placement is preferred.

**Rural Market Area** - These markets include all other areas other than those mentioned above. Rural areas have low density population and are usually classified as low growth areas. Land use includes agricultural and low density residential. Wireless communications antenna requirements include preferred line of site spacing between 5 and 6 miles.

## TYPES OF SERVICES PROVIDED

Telecommunication systems offer or will offer soon a variety of services as follows:

**Data Service** - Electronic transfer of data or digital information

**Specialized Mobile Radio Service (SMR)** - Two-way radio dispatch system most commonly utilized for voice communications such as Fire, Police & Dispatch Services (Operates in 800-900 MHZ)

**Enhanced Specialized Mobile Radio Service (ESMR)** - Two-way voice and data communications Most commonly utilized in the commercial transportation industry such as trucking and public transportation (Operates in 800 to 900 MHZ)

**Imaging Service** - Transmission of faxes, pictures, or slides

**Mobile Data Service** - Two-way wireless communication of text and voice messages

**Paging Service** - One-way voice and data communication

**Personal Telecommunications Service (PTS)** - Two-way voice and data communication and one- or two-way voice and data communications through electronic notebook computers and video mail service (telepoint).

## TELECOMMUNICATIONS SITE REQUIREMENTS

Telecommunications companies make site acquisition decisions based largely on cost of implementation. Because of the restrictions on antenna site development and sudden changes in technology, leasing of space on existing equipment is preferred. Leasing verse buying represents the most economical and expeditious alternative to the service providers.

Antenna site requirements include just enough space to handle the tower, antennas and the base station. Base stations typically house the power supply units, a transceiver unit, control switches and other antenna support equipment. These structures may be located as a stand alone unit, or with other building support equipment on the roof or in the basement. Direct AC power supply supports base stations combined with an integrated battery backup. A typical base station may include the following:

Transmitters/Receivers: 1-3 antennas on 1-3 panels. Power requirements are typically 220 volts, 60 amp service. Transmitter weight is 450-800 pounds. The size is 4'-6' high, 2'-3' feet wide and 2'-3' feet deep.

Base cabinets are as follows: PCS are 100 to 320 square feet, cellular 150 to 600 square feet and pagers 0 to 80 square feet.

Antenna types include whip, dish, panel, grid and cable.

Pagers and two-way mobile radio antennas are designed to provide coverage within a cell through an omni-directional (360 degrees), two-way (receiver/transmitter) whip antenna. These systems are limited as to service capability, and represent the smallest equipment requirement in terms of base stations, electric requirements, and tower space.

PCS and cellular equipment are comparable in equipment requirements. The antennas are specifically designed to provide coverage within a particular cell. If the desired cell coverage is 360 degrees, then a panel of three antennas is required. Each panel holds two receiver units and one transmitter unit. The first panel is set toward magnetic north, and the other two are placed equidistant at 120 degree intervals. This placement provides full rotational, or tri-sector coverage. The base station area requirements are typically being reduced as new technology provides for increasingly powerful equipment requiring less mounting space. Tower requirements rarely exceed a total height of 250 vertical feet. Most are the tripod type constructed with a structural capacity to handle three to five service providers.

### **Market Analysis**

A market is defined by a set of arrangements in which market participants are brought together to conduct a certain business. It is a geographic area or political jurisdiction in which alternative, similar properties effectively compete with each other. It is often defined by a particular property's utilization. The area is typically dependent upon existing transportation modes, industry classifications, population migration, established employment/ activity centers, and the quantity/quality of the labor force.

Market participants explore options to achieve full market coverage at the least cost. The site selection process typically considers the following:

- Availability of adequate electrical, fiber optics, and/or telephone lines
- Site accessibility
- If co-locating, consideration is given to existing or proposed antenna utilizations
- Adequate transmittal and reception area for network construction
- Site liability
- Propagation, technical, and security attributes

There are several ways that a service provider can accomplish real estate acquisition requirements. These are as follows:

1. Buy land and construct a tower (owner/user property)
2. Lease land and construct a tower, or place mobile equipment (ground rent)
3. Lease space on an existing tower/structure (co-location rental)

Land acquisition for tower construction is the least desirable as it requires a substantial investment. Companies prefer to co-locate on existing structures through lease or sublease arrangements, or acquire a ground lease to construct a tower or situate mobile equipment. When land acquisition is necessary, they acquire enough land to accommodate a pole structure and access easement. Antenna sites are generally less than 25,000 square feet with a majority range between 6,000 and 10,000 square foot.

Antenna leases are typically for a five-year term with the tenant being responsible for a pro-rata share of expenses. Expenses typically include management and routine maintenance, such as lawn care, minor repairs, lights, and cleaning/painting requirements. Options to renew range from 2% to 5% of annual rent.

Many market leases were analyzed. These leases were analyzed for similarities regarding use and location.

### Conclusion

The following market rents are applicable to the region:

Pagers and two-way radio omni-directional antennas requiring minimal base station requirements (less than 100 SF):

Market Area	Annual Net Rate
Dense Urban:	\$2,800 to \$6,000
Urban:	\$2,800 to \$6,000
Suburban:	\$2,800 to \$6,000
Rural:	\$2,800 to \$6,000

PCS and cellular equipment, single sector and tri-sector antennas with 100 to 600 square foot base station requirements:

Market Area	TYPE ANTENNA	Annual Net Rate
Dense Urban:	Single Sector	\$3,600 to \$8,500
Dense Urban	Tri Sector	\$16,800 to \$25,000
Urban	Single Sector	\$3,600 to \$8,500
Urban	Tri Sector	\$16,800 to \$25,000
Suburban	Single Sector	\$3,600 to \$6,000
Suburban	Tri Sector	\$14,000 to \$20,000
Rural	Single Sector	\$3,600 to \$6,000
Rural	Tri Sector	\$12,000 to \$20,000

Ground leases to accommodate owner-user telecommunications towers or transportable equipment typically requiring a land area of 6,000 to 10,000 SF:

<b>Market Area</b>	<b>Annual Net Rate</b>
Dense Urban	\$6,000 to \$15,000
Urban	\$4,000 to \$12,000
Suburban	\$4,000 to \$10,000
Rural	\$4,000 to \$10,000

The information presented was gathered from various sources including the Internet, telecommunications trade magazines and related publications, periodicals, market participants including property owners and tenants, brokers, and consultants.



## COMAPRABLES

LOCATION	CITY	STATE	LESSOR	LESSEE	USER TYPE	EFFECTIVE DATE	EXP DATE	SF	P.A. RENT	TYPE	AREA
SUITLAND FED CTR		MD	GSA	AT&T/LUCENT	PCS TS	01-Dec-96	2001	50	\$19,200	SL	U
10-B, 600 INDEP. AVE, SW,		DC	GSA	CELLULAR ONE	CELL OS	PENDING		N/A	\$3,600	SL	DU
FORRESTAL BUILD		DC	GSA	AT&T/LUCENT	PCS TS	01-Jun-96	2000	10	\$18,000	SL	DU
200 CONST AVE,		DC	GSA	AMER. PERSONAL COMM	PCS TS	01-Jun-94	1999	10	\$18,000	SL	DU
200 CONST AVE,		DC	GSA	AMER. PERSONAL COMM	IVDS TS	01-Sep-96	1999	120	\$18,000	SL	DU
200 CONST AVE,		DC	GSA	AT&T/LUCENT	PCS TS	01-Jun-96	2001	10	\$20,400	SL	DU
200 CONST AVE,		DC	GSA	BELL ATLANTIC	CELL TS	01-Dec-91	2000	560	\$16,000	SL	DU
200 CONST AVE,		DC	GSA	CELLULAR ONE	CELL TS	01-Dec-95	2000	560	\$20,600	SL	DU
18TH & F NW,		DC	GSA	BELL ATLANTIC	CELL TS	01-May-96	2001	360	\$20,000	SL	DU
7TH & D SW,		DC	GSA	BELL ATLANTIC	CELL TS	01-Sep-90	2000	300	\$20,400	SL	DU
13TH AND C, SW		DC	GSA	CELLULAR ONE	CELL OS	01-Dec-96	2001	21	\$3,600	SL	DU
451 7TH STREET, NW		DC	GSA	APC	IVDS TS	01-Sep-96	2001	120	\$18,000	SL	DU
451 7TH STREET, NW		DC	GSA	METRICOM	PAGER O	01-Aug-96	2001	10	\$2,800	SL	DU
451 7TH STREET, NW		DC	GSA	NEXTWAVE	PCS TS	01-Jun-97	2002	N/A	\$18,000	SL	DU